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IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

Field of the invention

The invention is directed to manual guidance by the user in control of a computer through a display interface, and in particular to the positioning of a cursor in the display by the movement of a computer mouse and further in particular to the addition of a frictional force component in the mouse movement that improves positioning control and efficiency.

Background of the invention and relation to the prior art.

As progress evolves in the control of a cursor through a display interface of a computer a number of considerations are operating to make accuracy in positioning and in turn user efficiency, increasingly difficult to achieve. In the art, a positioning device called a mouse has evolved that fits in the hand of the user and which has a rotatable element on the under side that rotates against the surface on which the mouse rests when the mouse is moved. The mouse internally has circuitry that provides and transmits signals correlated with the rotatable element movement that results in movement of the cursor or pointer on the display screen.

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Switching elements that deliver operating system signals through the mouse-display

interface can impose psychomotor limitations for a user. The switches are positioned to be under an adjacent finger when the mouse is in the hand of the user but the actuation force for each switch by the respective finger has force components in more than one direction that can introduce a movement force on the mouse that may disrupt the position of the mouse and in turn the cursor. Other users may have other types of hand coordination problems, making it difficult for them to reach and retain targeted locations with a mouse. Complexity is further added by operating system requirements for such actuation features as "double clicks". Complexity is still further added by the fact that some users as their experience and skills change could benefit by having some adjustability in the movement response of the mouse.

Operating system controls that are installed to introduce system biases favoring a particular user such as are discussed in U.S. Patent 5,642,131 also recognize that accurate cursor positioning directly to a particular desired location is inefficient because when the user is able to position the cursor close to the desired location overshoot and undershoot make precise positioning of the cursor difficult. Maneuvering the cursor directly to the desired location must be done with care, requiring slower action, which in turn affects productivity and efficiency.

mechanical resistance to any intermittent and unintended the motion of the mouse. In this embodiment, adjustment ability is achieved by reducing or increasing the area and/or thickness of the affixed magnetic element 113.

In Figure 6 another embodiment is provided of the use of a locallized magnetic field to provide the added frictional force. In the embodiment of Fig.6 , the arrangement is also one that is particularly suitable for use in portable and mobile environments. For optimum use in such environments, the mouse is typically cordless in which the cable 107 in previous figures is replaced by a transmitter located in the circuitry110.The mouse pad108 includes a coated or cloth-covered rigid sheet of steel or another ferromagnetic material 114. The magnetic field is provided by means of a relatively strong permanent magnet 115 such as, for example, a ½ inch diameter disc of SmCo that is screw mounted for adjustment to vary the spacing between the magnet 115, through the mouse pad 108 cover to the ferromagnetic material 114. The less the spacing, the greater will be the magnetic attraction. Where the magnetic attraction is increased sufficiently to support the mouse without detachment from its rigid mouse pad over a range of spatial orientations and/or accelerations, the result may be too much frictional force being added to enable comfortable use of the mouse. Such a problem is overcome by providing rollers in place of the usual protrusions. Two such rollers 116 and 117 are indicated in Figure 6.

The combination of weight or magnetic attraction is illustrated symbolically in Figures 3-6